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ABSTRACT

The differential reinforcement of other behavior (DRO) is a procedure in which one reinforces an individual when particular behaviors are not emitted for specific periods. This study was designed to determine whether a treatment package consisting of a modified DRO plus momentary restraint and/or noncompliance training could be used to reduce 12 maladaptive behaviors of six school-aged, severely mentally retarded, multihandicapped students. The subjects were treated as three pairs of subjects, each pair of which demonstrated four maladaptive behaviors. The results demonstrated that the treatment package was effective in reducing multiple maladaptive behaviors of the pairs of students even though the same DRO value was used for all four behaviors of each pair at a time. Practical adaptations that help to make DRO procedures more useful for teachers are discussed. (Author/CL)

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Programming DRO to Reduce Multiple Behaviors of Multiple Subjects

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Abstract

The differential reinforcement of other behavior (DRO) is a procedure in which one reinforces an individual when particular behaviors are not emitted for specified periods. Although often an effective procedure, DRO is sometimes inefficiently programmed because it is most often used with only one behavior and one person at a time. The purpose of this study was to determine whether a treatment package consisting of a modified DRO plus momentary restraint and/or noncompliance training could be used to reduce 12 maladaptive behaviors of students in the same classrooms. The subjects who were six school-aged, severely mentally retarded, multihandicapped students were treated as three pairs of subjects, each pair of which demonstrated four maladaptive behaviors. The results demonstrated that the treatment package was effective in reducing multiple maladaptive behaviors of the pairs of students even though the same DRO value was used for all four behaviors of each pair at a time. Practical adaptations that help to make DRO procedures more useful for teachers are discussed.

Programming DRO to Reduce Multiple Behaviors of Multiple Subjects

Special education classrooms for severely handicapped persons are frequently settings in which a considerable number of high rate maladaptive behaviors occur. In most cases, teachers of these students find themselves faced with the problem of ranking behavior problems so that they may focus their limited resources on those behaviors most in need of intervention. This procedure is also reflected in our treatment research in which we have typically targeted only one behavior at a time for treatment. By so doing, we have often precluded treatment of other maladaptive behaviors until success has been shown with a particular behavior. Moreover, treatment of other students in the setting has often been provided only after success has been achieved with the initial treatment targets. As the focus of intervention has moved to another treatment target, the improvement of the initial subject has sometimes begun to decay (Rusch & Kazdin, 1981).

Given these problems, the development of treatment packages that could simultaneously reduce several maladaptive behaviors of several students woule seem valuable. One of the treatment procedures frequently used to reduce maladaptive behaviors is the differential reinforcement of other behaviors (DRO). In this procedure, reinforcement is delivered at the end of a specified time during which the target behavior has not occurred (Kelleher, 1961;

Repp, Barton, & Brulle, 1983). These schedules have been shown to be effective both when used alone and in combination with other procedures (e.g., Barkley & Zupnick, 1976; Barrett, Matson, Shapiro, & Ollendick, 1981; Repp, Deitz, & Speir, 1974). In the common DRO procedure, a timer is reset when there is an occurrence of a target behavior (Lane, 1961). In that way, the penalty of reinforcement delay is greater than that which would have occurred if the individual had not responded throughout the interval (Uhl & Garcia, 1969). Although successful, this procedure has not been used with more than one behavior at a time, presumably because the occurrence of one response would reset the timer for all behaviors under study. Thus, those of us using DRO have typically treated one behavior of one subject at a time. These restrictions greatly limit the practicality of DRO in classrooms of handicapped children since teachers must also concentrate on a number of other matters (e.g., social training, self-help skills, mobility).

A procedure which allows a teacher to focus on several behaviors of one or more students simultaneously would have significance if the procedure were easy to use in classrooms. Therefore, the purpose of this study was to explore the extent to which a DRO-based technique to could simultaneously reduce four behaviors of each of three pairs of students. In this treatment package, two modifications of the clinically proved DRO procedure was used. (a) The DRO interval was not reset after each response;

rather, it was reset after the interval expired whether or not responding occurred; and (b) the same DRO value was used with four behaviors of two subjects.

Method

Subjects and Setting

Six students served as subjects in this experiment. All were of school age (i.e., 6-16 years old) and all were identified by the local school district as severely retarded and multihandicapped (i.e., severe mental retardation and at least one additional handicapping condition). The students were enrolled in a 6-week summer school program designed to provide treatment to individuals who had exhibited maladaptive behaviors that had significantly interferred with their educational program, and that had not been effectively treated during the past academic year. These students exhibited a variety and number of maladaptive behaviors. The summer program was housed within the classroom which during the regular academic year also housed similar students. Although only 6 students participated in these experiments, 18 students were enrolled in the program. Two teachers, each certified and having 1 and 3 years teaching experience with similar students, and seven aides, having 0 to 5 years experience, served as the staff for the program. In addition, the first author served as program director.

Behavior Selection and Data Collection

Target behaviors were determined prior to the beginning of the studies based on data gathered before the summer program. Behavioral definitions were generated through discussion with each of the student's teachers, parents, and other caregivers. Definitions were:

(a) mouthing (S_1 and S_3) -- S brings an object or his fingers into contact with his mouth except where appropriate (e.g., eating food).

(b) throwing (S_1) -- S throws an object without specific instruction to engage in such behavior (e.g., throwing a ball when instructed).

(c) hair plucking (S_2) -- S grasps any hair (e.g., eyebrow, leg hair) and removes or attempts to remove the hair.

(d) finger flicking (S_2) -- S brings her fingers into repeated contact with another object or her fingers. This contact must be rapid, repeated, and apparently purposeless.

(e) light gazing (S_5 and S_6) -- S looks toward the lights on the ceiling when neither requested nor instructed to do so.

(f) head weaving (S_5) -- S moves his head in a weaving, horizontal, back-and-forth manner.

(g) hand flapping (S_4 and S_6) -- S moves his hands and/or arms up and down or back and forth repetitively, unless appropriate (e.g., waving).

(h) noncompliance (S_3) -- S does not respond or resists responding when asked a question or given an instruction, when such question or instruction had successfully and consistently elicited a correct response under similar situations with staff.

(i) head slapping (S_4) -- S brings his hand into forceful contact with his head.

Data were collected by trained observers who recorded the frequency of each response. Interobserver reliability was determined by having a second observer record the frequencies of the target behaviors and by comparing that record with that of the primary observer. Reliability estimates were gathered at least once during each phase of the study, and the values were calculated by dividing the smaller frequency by the larger and multiplying by 100. In all cases, the reliability estimates were greater than 80%. the specific values were (a) mouthing - 91%, (b) throwing - 94% (c) hair plucking - 93%, (d) finger flicking - 89%, (e) light gazing - 85%, (f) head weaving - 91%, (g) hand flapping - 89%, (h) noncompliance - 96%, and (i) head slapping - 95%.

Procedure

Three response-reductive procedures were in effect for this study: DRO, compliance training, and momentary restraint. In its typical use, DRO involves providing reinforcement when a particular response does not occur for a specified interval, and resetting the

interval whenever responding does occur. Given the large number of behaviors (12) which were simultaneously trying to reduce, we modified this procedure and made it easier by resetting a timer only after its expiration. To make the timing still easier for the teachers, the experimenters provided prerecorded cassette tapes that signalled when intervals expired and students could be reinforced.

The programming of the DRO interval was determined (a) for the first day by using the inverse of the mean baseline rate of all target behaviors during baseline and (b) each subsequent day by using the inverse of the mean rate for target behaviors for each previous day (Barton, Meston, Brulle, & Repp, Note 1). The expiration of each interval was signalled by various tapes which contained sounds every n seconds (e.g., every 30). If there were no tape with the precise DRO interval available (e.g., 67 sec was needed and only 60 and 90 sec were available) the next smallest value was used. Thus at times, our practical needs further increased the reinforcement density.

In addition to receiving the DRO program, some students received either compliance training or momentary restraint. The former was used when a student refused to respond or responded inappropriately to a request by an instructor that the instructor historically knew that the student could perform. The appropriate behavior was manually guided 5 times and the student was again asked to respond. If the student did not do so within 5 seconds, the

procedure was repeated. This procedure was used with the non-compliance response of S_3.

The third procedure, momentary restraint, was included in the treatment package in order to have a consequence for behaviors (e.g., aggression) that had to be stopped. In this study, it was defined as contingent immobilization of the part of the body involved in the maladaptive behavior for periods fo 5 to 10 seconds. This procedure was chosen because it (a) directly affected the specific part of the body involved in the response, (b) could be quickly implemented, (c) could be quickly learned by the staff, and (d) had demonstrated effectiveness with similar students (e.g., Barton, Meston, & Brulle, Note 2; Luiselli, 1981). The rule governing the use of the momentary restraint procedure was that initial use would be for periods of 3 seconds with an increase to the 5- or 10-sec duration if the lower durations had proved ineffective. Therfore, each occurrence of a targed behavior that was not appropriate for the non-compliance training was consequated by momentary restraint. In addition, at the end of each DRO interval that elapsed without the emission of any targeted behavior, the student received reinforcement. Non-compliance training and momentary restraint consequences could each be rapidly applied when a response was emitted and the DRO consequence could provide reinforcement for intervals in which there were no maladaptive behaviors. In addition, we should note that because of the

definitions of compliance training (used when the target behavior occurred in place of compliance) and momentary restraint (used only after responses that needed to be stopped), DRO was the primary procedure in use.

Conditions

Three conditions were used in this study, although two subjects (S_5 and S_6) only experienced two of them. Baseline consisted of the regular staff treatment of the target behaviors. Multiple DRO Values consisted of momentary restraint or compliance training and DRO in which the interval length was determined for each of the target behaviors. Single DRO Value consisted of momentary restraint or compliance training and a single DRO value used for four behaviors of each pair of students. In this procedure, the DRO value was chosen to reflect the highest response rate of either of the students in the past. Therefore, rather than having up to four different DRO intervals, we had only one interval. In this way, the practicality of the procedure was greatly enhanced.

Design

The six students were placed in three pairs. In the first pair (S_1 and S_2), two behaviors of each student were put under three conditions. During the first 5 days, mouthing and throwing by S_1 and finger flicking and hair plucking by S_2 were under baseline conditions. During the next 12 days, both Ss were in the Multiple DRO condition in which DRO values were independently determined for

each behavior. During the last phase (Single DRO value), a single DRO value was used for all four behaviors.

The same general schema was followed for subjects 3 and 4 with the exception that the days in each phase differed, with Baseline consisting of 10 days, Multiple DRO consisting of 12 days, and Single DRO consisting of 8 days. This design provided two ways in which treatment effects could be analyzed. First, there was a simple replication involving four subjects with whom an ABB' design was used. Second, there was a multiple baseline design superimposed on the ABB' design in which the first pair of Ss constituted one unit and the second pair consisted another unit.

The last pair of Ss were placed under two conditions only, Baseline and Single DRO. The objective here was to determine whether the Multiple DRO condition was necessary. We did not, however, wish to place all six subjects in this design as we were more confident that the three-phase design would achieve therapeutic effects.

Results

Figure 1 presents the data for the first four subjects and

Insert Figure 1 about here

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indicates the ABB'-multiple baseline design. The first two subjects spent 5, 12, and 10 days in the Baseline, Multiple DRO, and Single DRO conditions and responding showed the following means in those conditions: (a) mouthing (S_1) -- .55, .08, and .02 rpm; (b)

throwing (S_1) -- .12, .02, and .01 rpm; (c) hair plucking (S_2) -- .39, .03, and .01 rpm; and (d) finger flicking (S_2) -- .55, .01, and .02 rpm.

The same pattern of decreased responding was displayed by the second pair of Ss involved in this multiple baseline. For the 10, 12, and 8 days these students spent in the three conditions, their mean rates of responding were: (a) mouthing (S_3) -- .20, .04, and .04 rpm, (b) non-compliance (S_3) -- .07, .00, and .00 rpm; (c) head slapping (S_4) -- .60, .04, and .01 rpm; and (d) hand flapping (S_4) -- .58, .12, and .02 rpm.

Figure 2 depicts the data for the last pair of subjects who

Insert Figure 2 about here

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participated in only two conditions: Baseline and Single DRO. The intent here was to determine whether the effects found with the first four subjects could be approximated even though the Multiple DRO phase was eliminated. Results show very similar levels of responding across the four behaviors four the 8 days of baseline and 19 days of treatment: (a) head weaving (S_5) -- .11 and .02 rpm, (b) light gazing (S_5) -- .24 and .06 rpm; (c) light gazing (S_6) -- .44 and .19 rpm, and (d) hand flapping (S_6) -- .33 and .06 rpm.

Discussion

The results clearly show that the treatment program was effective in reducing the maladaptive responding of all students.

In addition, the results show that the treatment program was effective in doing so when more than one behavior was of interest and when more than one behavior of more than one student was of interest. The results were accomplished by teachers and aides in a classroom environment and were achieved while the regular educational materials were in use (i.e., instructional programs were ongoing with the treatment package). Therefore, the purpose of this study, i.e., to determine if a treatment package consisting of DRO, momentary restraint, and non-compliance training could be effectively used to reduce more than one maladaptive behavior of individuals and of more than one individual, was successfully accomplished. Several maladaptive behaviors were simultaneously reduced in individuals (Figure 1) when treated alone and the response suppression was maintained or improved when treatment was provided to these individuals within pairs in the Single DRO condition (Figure 2) although the effects were not quite so pronounced as they were when the Multiple DRO condition had been used.

The success of this particular use of DRO, sometimes with and sometimes without compliance training or restraint, and with more than one behavior or individual, should allow teachers to expand the number of problem behaviors addressed and to do so in a way that allows continued habilitative programming. In addition, the modification of the DRO procedure has provided the teacher with an

effective and useful procedure quite unlike the traditional DROs described as impractical and difficult to implement by Poling and Ryan (1982). Secondly, response maintenance becomes an integrated portion of the treatment program. As the momentary restraint and/or non-compliance training programs decelerate the maladaptive behaviors, the DRO program reinforces progressively longer intervals during which there has been no occurrence of the target behaviors. These results seem to indicate that the treatment package is both effective and efficient when used in applied settings to decelerate the maladaptive behaviors of groups of severely, multihandicapped students.

More research is needed in this area as DRO procedures become more commonplace in our schools. For example, the question of maintenance of behaviors becomes critical when one considers than many of our students will begin to spend more and more time outside of the school setting. While one might presume that, as the students learn to function appropriately on long intervals of reinforcement, they would maintain improvement in other situations, this assumption needs empirical investigation. Similarly, the maintenance of appropriate responding within the school once the DRO program is stopped needs study. Even occasional reinforce delivery in the longer DRO values might serve a discriminative function that would be lost when the DRO program is stopped. However, while further research is needed, this study demonstrates that DRO

procedures can be effectively used by classroom teachers and aides. While modifications have been made from the clinical definition of DRO, these modifications have greatly increased the practicality and efficacy of the procedures.

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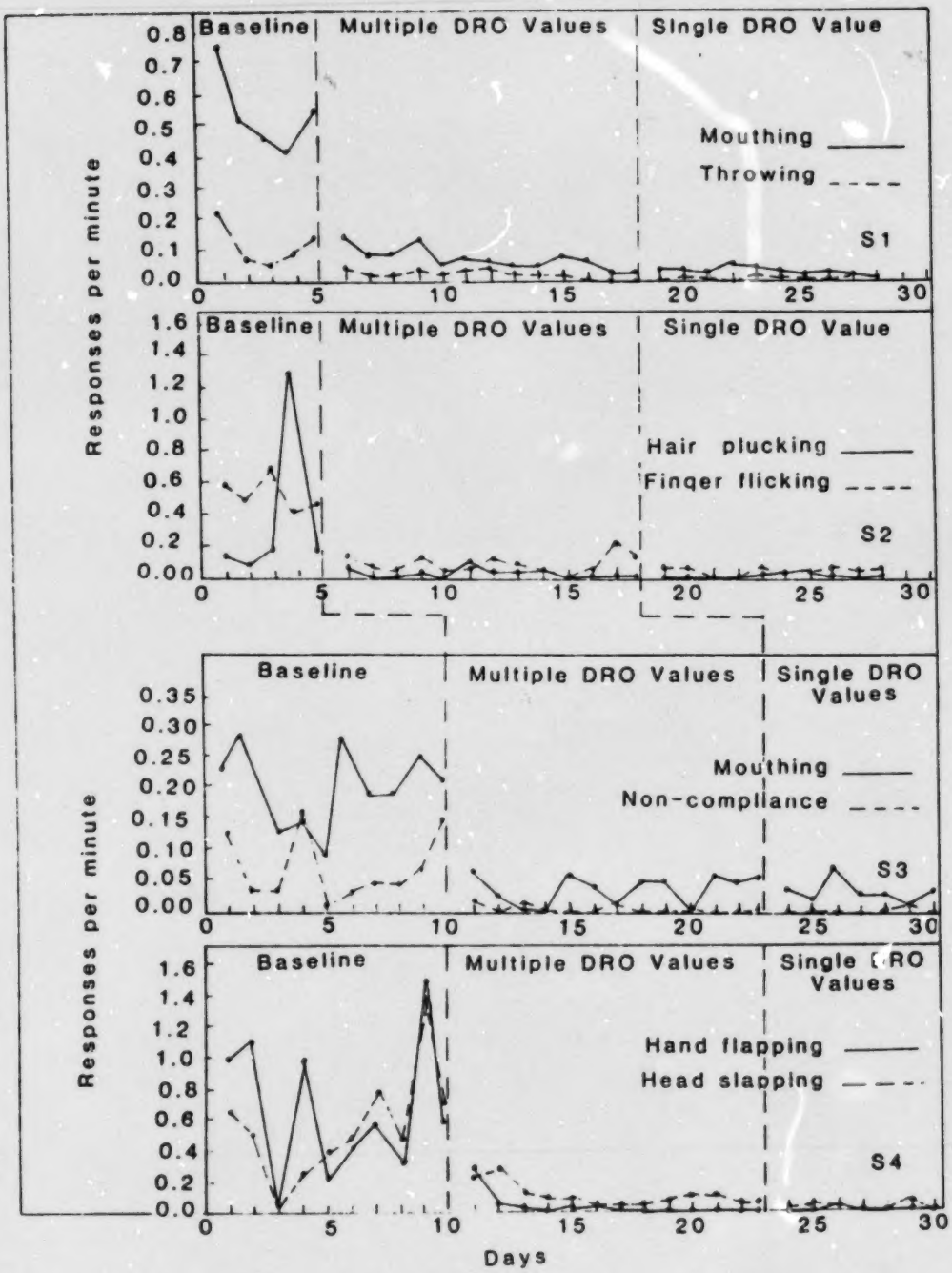
FIGURE LEGENDS

Figure 1. The rate of stereotypic responding for four subjects under three conditions: (a) baseline; (b) Multiple DRO Values, on which an individual DRO value was determined for each of the behaviors; and (c) Single DRO Value, in which a single DRO value was used for the four behaviors of each pair of subjects.

Figure 2. The rate of stereotypic responding for two subjects under two conditions: (a) baseline, and (b) Single DRO Value, on which a single DRO value was used for the four behaviors of this pair of subjects.



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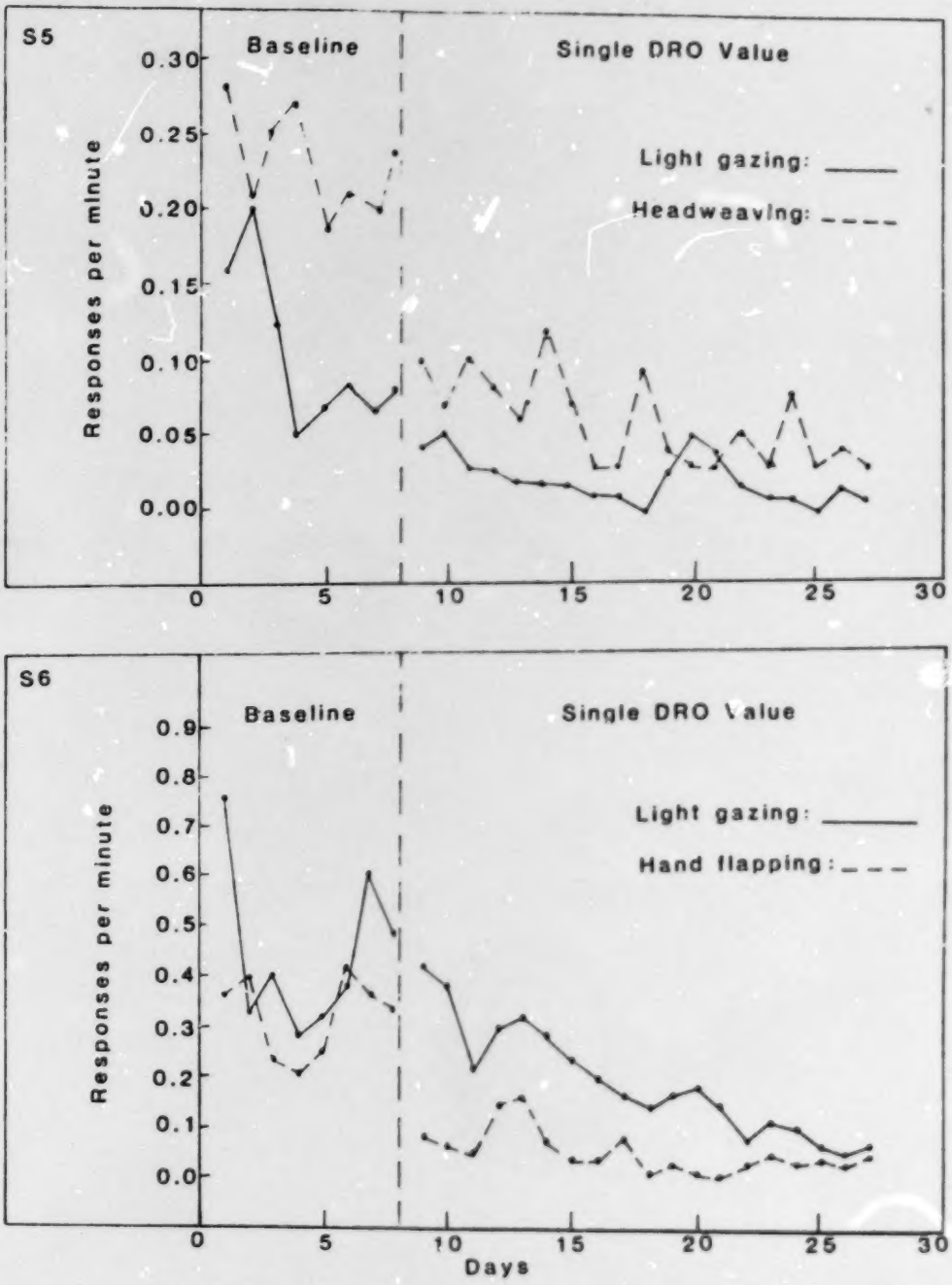

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